THE REASONS FOR THE RISE IN CHILDHOOD MORTALITY DURING THE 1980s IN ZAMBIA*

IDS WORKING PAPER 76

Chris Simms, John T.Milimo, and Gerald Bloom#

SUMMARY

Between 1980 and 1991 the proportion of Zambian children dying before reaching five years of age rose from 15 to 19 percent. This paper explores why this happened. There are no data on trends in morbidity. However, there is information about the number of visits to health facilities each year by children with common illnesses. They increased for malaria but fell for diarrhoea and acute respiratory infection. This does not suggest a dramatic increase in the incidence of these illnesses. There also was no evidence of an increase in malnutrition. The HIV epidemic began to affect health by the end of the decade, but it does not fully explain the large increase in childhood mortality.

Government health expenditure fell substantially, in real terms, during the 1980s. There was a particularly sharp fall in non-personnel expenditure on rural health services. This appears to have had a negative impact on the effectiveness of primary health care. Zambian mothers were as likely as mothers elsewhere in Sub-Saharan Africa to consult a health worker when their child fell ill, but their child was less likely to receive specific drug therapy. One sign that health services had deteriorated was that case fatality rates rose in health facilities.

Childhood mortality varies considerably between Zambian districts. This variation cannot be explained by differences in levels of poverty or malnutrition. However, there is a negative relationship between the proportion of medically supported births and childhood mortality. This suggests that certain health services can reduce the proportion of children who die. Many deaths could have been prevented during the 1980s if all district health services had performed as well as the best. More work is needed to identify the factors which enabled some districts to provide better health services than others. Unless strong measures are taken to reverse the trend, childhood mortality could continue to rise.

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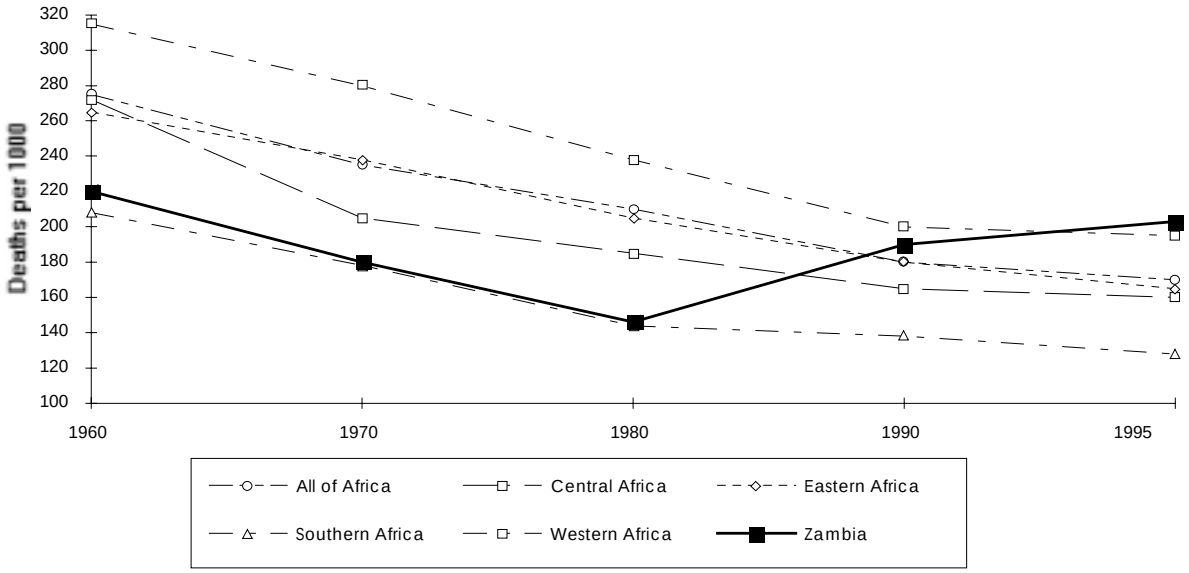
Chris Simms is an independent researcher currently based at the University of Sussex. John Milimo is the Director of the Participatory Assessment Group. He can be reached at PO Box 51080, Lusaka, Zambia. Fax: 260-1-254801 Gerald Bloom is a Fellow of the Institute of Development Studies. He can be contacted at the Institute of Development Studies at the University of Sussex, Brighton, BN1 9RE, United Kingdom. Tel: +44-1273-678733. Fax: +44-1273-621202. E-mail: .

1 INTRODUCTION

Between 1980 and 1991 the proportion of Zambian children dying before the age of five rose from 152 to 191 per 1000 live births.[1] Figure 1 presents trends in childhood mortality in Zambia and in different regions of Africa between 1960 and 1995. Under-five mortality fell during the 1980s and 1990s in most of Africa, but at a slower rate than previously (Cornia et al 1997, Timaeus 1997, 1998). It is important to understand why Zambia's experience was so different.

Figure 1: Trends in under-five mortality in Africa, 1960-95



Source: Cornia and Mwabu 1997, Gaisie et al 1993, MoH 1997

A number of attempts have been made to explain Zambia's childhood mortality patterns.[2] The present study was supported by a small grant from the British Department for International Development to test the hypothesis that a deterioration in basic health services contributed to the rise in mortality. It uses secondary data supplemented by small case studies in four districts.

This report is structured as follows. Section 2 discusses the sources of data. Section 3 discusses evidence regarding the level of exposure to illness and the factors which influence a child's response to infection. Section 4 discusses the changes which have taken place in the provision of health services. Section 5 analyses the reasons for the large variations in childhood mortality between districts. Section 6 presents the findings of a participatory study in four districts in which users and providers of health services gave their opinions about the reasons for the mortality increases. Section 7 summarises the findings and discusses their policy implications.

2 SOURCES OF DATA

There have been a number of surveys covering a variety of issues relevant to health. The ones used for this report include:

- the Zambian Demographic Health Survey (1992), similar surveys in other countries, and the preliminary findings of a follow-up survey in 1996;
- the Social Dimensions of Adjustment Priority Surveys I and II;
- surveys and studies undertaken by the National Food and Nutrition Commission;
- National Census data produced by the Central Statistics office of Zambia;
- analyses of public health expenditure undertaken by the World Bank and UNICEF; and
- district food insecurity and ecological vulnerability studies.

Every facility is required to submit an annual return to the district and they, in turn, submit reports to the Ministry of Health. The Ministry collates these returns into annual statistical reports, which summarise data as provincial means. For the purpose of this report, the district returns were reviewed and district means were used, to make it possible to analyse inter-district variations in mortality. In addition, the annual reports for the mission hospitals during the study period were reviewed and the relevant data were recorded.

The quantitative data were complemented by qualitative information. A number of interviews were held with key informants in the Ministry of Health, the mission hospital sector, and other ministries. In addition, the Participatory Assessment Group carried out a participatory rural appraisal in four rural districts. The methodology is described in a separate report (Milimo 1997).

The study provides a reasonably accurate impression of reality, by combining quantitative and qualitative methodologies. This was achieved at a relatively low cost. One aim was to assess whether a more substantial study of the relationship between child health and effective health services was justified.

3 FACTORS WHICH INCREASE THE RISK OF ILLNESS AND DEATH

This section explores evidence regarding the contribution of non-health service factors to the mortality increase. There is a lot of information on nutrition but very little on other factors that predispose children to illness and death. Consequently, much of this section is concerned with determining whether levels of sickness increased during the 1980s. If they did, it would suggest that non-health service factors contributed substantially to the rise in mortality.

One source of data on childhood morbidity in Zambia is the ZDHS survey, carried out in 1991. It provides information on the incidence of the major childhood diseases, but does not measure trends. It is necessary to take the following shortcomings into account in drawing inferences about levels of ill health in the community: its reliance on reports of symptoms by mothers with varying levels of education; its neglect of seasonality; and its limited information on inter-district variation.

Another source of data is the routine returns from health facilities. They record the diagnosis of all outpatient consultations and inpatient admissions. This is a limited source of information on morbidity in the community. The number of patients attending health facilities reflects both the willingness of people to consult a health worker and the burden of disease. Also, the data are unreliable since not all health facilities report every year, and the accuracy of recorded diagnoses depends on the skill and conscientiousness of the health workers.

In spite of these shortcomings, the facility-based data provide an indication of broad morbidity trends. One piece of evidence that suggests that consultation rates reflect underlying morbidity comes from a comparison of districts served by government and mission facilities. The latter suffered less deterioration of services and shortages of drugs than the former (Section 6). If the only reason for a change in the number of cases of childhood illness was an altered willingness to visit a facility, one would expect a systematic difference in reported morbidity between districts served by mission and government hospitals. In fact, the change in the number of cases per capita was almost the same in both.

3.1 Incidence of Common Childhood Diseases

The ZDHS survey found that a high proportion of children had symptoms of acute respiratory tract infection (ARI), malaria, or diarrhoea during a two week period (table 1). These three problems and malnutrition are amongst the most important causes of childhood death in Zambian health facilities. The number of deaths in facilities from these causes rose substantially during the 1980s (figure 2). It should be noted that only a fraction of deaths occurred in health facilities.

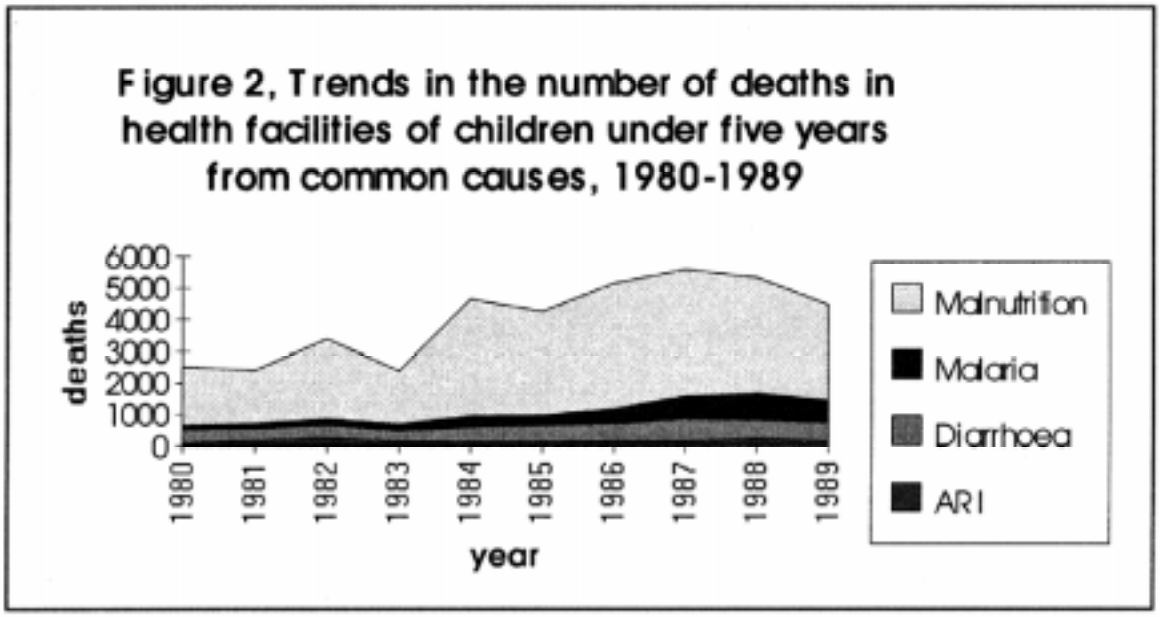
Table 1: Incidence of specific symptoms amongst children under 5 years during the two weeks preceding the survey, 1992

	Acute respiratory infection (%)	Malaria (fever) (%)	Diarrhoea (%)
Urban	10.2	34.0	20.0
Rural	15.0	52.4	25.3
National	12.7	43.7	22.8

Source: Gaisie et al 1993

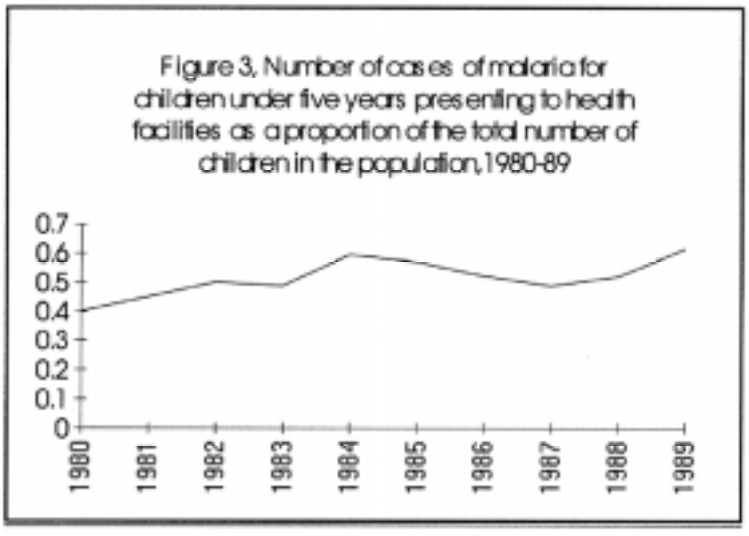
3.1.1 Malaria

In 1989 malaria was the second largest cause of death of children under five years old in health facilities. According to the ZDHS, 44% of children reported symptoms consistent with malaria during a two week period. The number of reported hospital admissions and outpatient cases of malaria increased, between 1980 and 1989, from 0.4 to 0.65 per child per year (figure 3).



Source: Collected MoH/MCH data

There are several reasons for the increase in the number of malaria cases presenting to health facilities.[3] These include greater exposure to the malaria parasite due to the erratic mosquito control programmes; increased virulence of the parasite, which caused a rise in the incidence of cerebral malaria; a rise in drug resistant malaria; and failure to treat, due to shortages of anti-malaria drugs in government health facilities. The rise in malaria mortality was due to a combination of a change in the characteristics of the disease and a failure of health services to prevent transmission of the disease and deliver effective treatment.



Source: Collected MoH/MCH data

3.1.2 Diarrhoea

Diarrhoea is an important cause of deaths in health facilities, according to MOH statistics. Diarrhoeal diseases are usually associated with lack of clean water. The availability of safe water did not improve over the decade, according to a recent report (GRZ 1996). However, the number of cases amongst children under 5 years reported by hospitals and health centres decreased, between 1980 and 1989, from 0.77 to 0.45 per

child per year. This may be due to a programme to promote oral rehydration therapy which began in 1982. The ZDHS (Gaisie et al 1993) found that 95% of mothers knew about oral rehydration solution and more than 80% of them used it. This may explain the reduction in the number of cases of diarrhoeal disease at health facilities.

3.1.3 Acute respiratory tract infection

ARIs are an important cause of death of children under five years in health facilities. The DHS found that 13% of children had symptoms of an ARI during the preceding two weeks in 1992. The number of hospital admissions and outpatient visits by children under 5 years for an ARI decreased, between 1980 and 1989, from 1.1 to 0.8 per child per year. It is difficult to determine the degree to which this represents an increasing unwillingness of parents to bring their sick children to a health facility, and how much there was a real fall in the number of cases.

3.1.4 Comparison with other countries

The number of cases of common childhood diseases presenting to health facilities does not measure morbidity directly. However, the trends do not suggest a major increase in the incidence of infectious diseases during the 1980s. Table 2, compares the incidence of common childhood diseases in Zambia and 10 other countries in sub-Saharan Africa. Zambian children had a slightly lower than average incidence of diarrhoea and ARI and a higher incidence of fever.

Table 2: The proportion of children with symptoms of common childhood diseases in a 2 week period preceding demographic and health surveys (1986-1992)

	U5MR*	Diarrhoea (2 wks. prev.)	Diarrhoea (24 hours prev.)	Fever (4 wks. prev.)**	Respiratory Illness (2 wks. prev.)
Botswana	48	11.3	04.8	04.3	30.3
Burundi	180	17.6	08.4	08.0	38.6
Ghana	170	27.2	13.9	36.4	20.6
Kenya	83	13.0	06.8	42.7	17.5
Liberia	185	43.2	NA	56.6	41.1
Mali	200	35.9	20.2	34.5	06.5
Senegal	156	39.9	NA	61.1	NA
Togo	143	30.3	14.6	44.2	09.3
Uganda	185	26.4	15.4	44.2	22.2
Zimbabwe	58	15.3	09.5	07.0	48.0
Median	163	26.8	11.7	39.6	22.2
Zambia	190	22.8	08.1	43.7	12.7

*1990 U5 mortality rates from WB *Better Health in Africa*, 1994 **Togo and Zambia were surveyed for prevalence rates for two weeks preceding the survey.
Source: Boerma *et al*. 1991 and ZDHS 1992 (Gaisie *et al.* 1993).

3.2 Malnutrition

Malnutrition is an important direct cause of death and it makes children more likely to become ill and less likely to recover. There are three common measures of malnutrition:

- *stunting*, low height for age, reflects past or chronic malnutrition;
- *wasting*, low weight for height, reflects recent or acute malnutrition; and
- *underweight*, low weight for age, reflects either chronic or acute malnutrition.

Table 3 presents data on levels of moderate and severe stunting and under-five mortality for a number of countries in sub-Saharan Africa. Zambia reported average levels of stunting and higher than average rates of under-five mortality.

The evidence on Zambian malnutrition during the 1980s is contradictory. The Statistical Bulletin of the Ministry of Health suggests that 7.3 percent of children, for whom growth monitoring data were collected, were underweight in 1980 and 24.5 percent in 1990. All other studies indicate that between 25 and 30 percent of children were underweight during the early 1980s.[4] The apparent rise in the proportion of children reported as underweight in routine monitoring may have been due to the recruitment of the less well educated mothers, living farther from the health facility, as the primary health care programme became established.

Table 3: Levels of malnutrition and U5MR for selected countries in 1987

Country	Stunting 1987	U5MR 1987
Ethiopia	43	261
Rwanda	45	209
Zaire	40	164
Togo	36	156
Liberia	38	150
Lesotho	23	139
Malawi	61	267
Botswana	56	95
Cameroon	43	156
Kenya	41	116
Median	42	156
Zambia*	39.6	180

Source: UNICEF 1989, *Gaisie *et al.* 1993

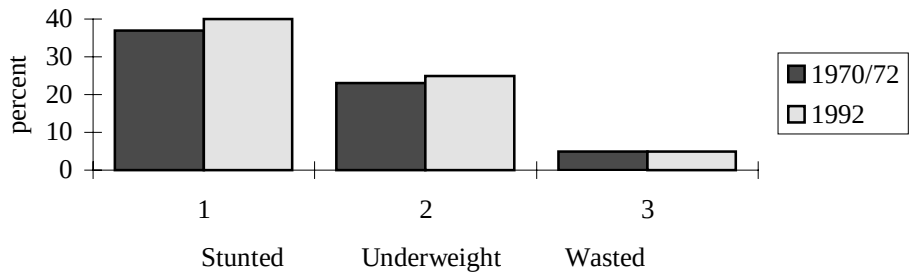
Several reports argue that supplementary feeding and primary prevention activities deteriorated during the 1980s. However, there is evidence that increased availability of cereal contributed to stable nutrition levels.[5] Food subsidies, which kept the price of mealie meal low, played an important role in maintaining nutrition levels.[6]

Levels of malnutrition do not appear to have changed greatly between 1970 and the early 1990s (figure 3). The proportion of children who were wasted, stunted and underweight remained relatively constant at 5,

40 and 25 percent, respectively. The number of children under 5 years presenting with a diagnosis of malnutrition fell slightly, between 1980 and 1989, from .063 to .058 per child, which is consistent with relatively constant levels of nutrition.

The situation changed during the 1990s. Price subsidies on basic foods were ended and during the early part of the decade Zambia experienced its worst drought in many years. Surveys carried out in 1993 and 1995 found that between 48 and 53 percent of children were stunted. The preliminary findings of a demographic and health survey carried out in 1996 found a higher proportion of stunted children.[7] This suggests that the number of chronically malnourished children rose substantially during the 1990s.

Figure 3, Undernutrition amongst Zambian Children, 1970/72 and 1992



Source: Hunt et al 1994

3.3 HIV/AIDS

One possible explanation for mortality increases is that infection with HIV made children more susceptible to fatal infections. There are no direct measures of the prevalence of HIV amongst children during the 1980s, nor are there good data on the number of HIV-related deaths. Therefore, the analysis must be indirect.

Recent research into the impact of the HIV epidemic on childhood mortality in SSA using DHS data collected in 32 African countries between the mid-1980s and mid-1990s and HIV infection data collected at ANC clinics indicates that prevalence rates may have been sufficient to increase under-five mortality by 15-20 per 1000 births by the late 1980s in Rwanda, Uganda, Zambia and Zimbabwe. In the case of Zambia however, part of the explanation for mortality reversals is that "other factors were not exerting a strong downward influence on mortality" (Timaeus 1998). Table 4 indicates that in Zambia like other countries in SSA, the epidemic had a much larger impact on urban residents and those with more education.

Table 4: HIV infection and education attainment by residence according to age-group (%)

Years of School	age 15-19		age 20-24		age 25-29		age 30-44	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
0-4	18.4	6.8	21.7	9.5	20.7	9.5	20.0	7.2
5-6	20.9	10.1	27.1	11.3	27.3	15.6	19.3	11.4
7	19.8	11.0	30.6	16.2	29.9	17.4	19.8	11.7
8+	22.1	10.4	38.4	28.2	40.9	31.7	29.1	17.7

Source: Fylkesnes *et al.* 1997

Review of Zambian childhood mortality trends shows that in rural Zambia, under-five mortality increased during the second half of the 1970s and first half of the 1980s. Infant mortality began to increase during the mid-1970s and continued to rise until the mid-1980s. After 1985 rural childhood mortality levelled-off, at the time when prevalence of HIV infection is believed to have been rising. The largest increases in rural infant mortality were at the periphery - isolated from the epidemic. Child mortality (ages 1-4) fell slightly during the second half of the 1980s. These trends suggest that HIV infection was not an important contributor to the rise in rural childhood mortality. In contrast, urban under-five mortality increased gradually from the late 1970s until the mid-1980s and there was a sharp increase during the second half of the 1980s. Urban infant mortality followed rural trends but with a four-years time-lag possibly representing a greater resilience to economic declines in urban settings. The increase in the second half of the 1980s in urban Zambia suggests the influence of HIV infection.

3.4 Summary

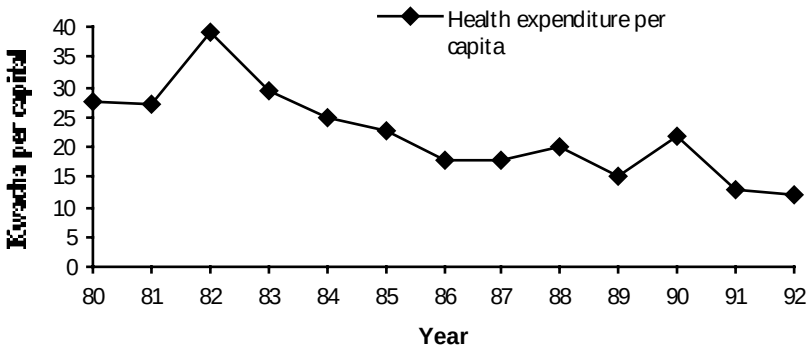
The evidence regarding trends in childhood morbidity during the 1990s is mixed. The incidence of malaria increased and there are indications that HIV infection made children more susceptible to infection by the end of the 1980s, particularly in urban areas. On the other hand, the number of cases of ARI and diarrhoea reaching health facilities decreased and the levels of malnutrition were relatively stable during the 1980s. This suggests that other factors played an important part in the mortality rise.

4 HEALTH SERVICE PROVISION

4.1 Public Health Expenditure

According to Freund (1986), real health expenditure per capita fell by 46 percent between 1970 and 1981. It fell by a further 44 percent during the subsequent decade (figure 4). These decreases in health expenditure had a major effect on service delivery.

Figure 4: Government health expenditure per capita at constant (1984) prices



Source: Kamanga (1995)

The negative effect on the delivery of basic services was exacerbated by the way the cuts were applied (table 5). During the second half of the 1980s the government reduced grants to mission hospitals and allocations to the provincial health services substantially; it cut the budgets of the central and specialised hospitals more modestly. The provincial health services provide most public primary care services. These data suggest that the MOH did not take its stated priorities into account in imposing budgetary cuts during the second half of the 1980s. In trying to preserve all of its services, it ensured that none were adequately funded (Bloom 1996).

Table 5: Health expenditure by function in constant (1984 kwachas) as a ratio of spending during 1981-86

Function	1981-86 average	1987 actual	1989 actual	1991 budget
Administration	1.0	1.8	1.0	1.4
Centralised procurement	1.0	1.4	1.9	1.6
Transfer to local institutions and mission hospitals	1.0	1.7	0.3	0.3
Major referral and specialised hospitals	1.0	0.2	0.5	0.7
Training, research and testing institutions	1.0	0.7	0.6	0.8
Provincial health services	1.0	0.5	0.4	0.5
TOTAL	1.0	0.8	0.6	0.7

Source: World Bank 1992 (table 5.7)

A second factor which magnified the effects of financial constraints was the disproportionate reduction in expenditure on non-personnel operating costs. Spending on materials and other non-personnel items fell substantially, in real terms between 1987 and 1991 (table 6). This reduced the effectiveness of the available personnel.

The low levels of spending on non-personnel items diminished health service effectiveness. The MOH has not documented the frequency of shortages of essential drugs, but a number of participatory rural appraisals found that people consistently complained that drugs were not available at health facilities

(World Bank 1994). Another consequence of the unavailability of funds was a lack of transport. This made it difficult for health centres (most of which did not have doctors) to refer patients. It also left many rural health workers unsupervised. The cut in non-personnel expenditure was particularly severe for the provincial health services. This amplified the negative impact of the resource constraints on the provision of effective primary health care services.

Table 6: Health expenditure by economic type[1] (in constant 1984 K million)

Economic type	1987	1989	1991
Personal Emoluments	56.6 (65%)	35.9 (56%)	49.0 (64%)
Materials and other non-personnel	26.5 (30%)	18.4 (29%)	20.4 (22%)
Capital expenditure[2]	4.6 (5%)	10.2 (16%)	10.4 (13%)
SECTOR TOTAL	87.6 (100%)	64.5 (100%)	76.4 (100%)

1. These data were prepared as a special study for the 1991 Public Expenditure Review (World Bank 1992). The study estimated the allocation between economic categories of the money paid as grants to mission facilities and hospitals.
2. The rise in capital expenditure during 1989 and 1991 was due to the rehabilitation of the University Teaching Hospital.

Source: World Bank 1992 (table 5.9)

4.2 Access to Effective Care

There are a number of anecdotal reports of a decline in the quality of health services during the 1980s. They mention run down facilities without equipment, lack of supervision of front-line health workers and shortages of drugs. However, no systematic studies of service provision were carried out. This section uses utilisation of outpatient services and inpatient case fatality rates as indicators of access to services and the quality of care, respectively.

4.2.1 Utilisation of outpatient services

During the 1980s, Zambian mothers were slightly more likely to consult a health worker, when their child fell ill, than mothers in 10 other countries in sub-Saharan Africa (table 7). However, they were much less likely to receive drug therapy for an ARI or diarrhoea. On the other hand, Zambian children were more likely to receive oral rehydration solution for diarrhoea and antimalarials for a fever.

Utilisation of ante-natal care and assisted delivery can be used as a general indicator of access to health services by rural residents (Gbesemete and Gerdtham 1992).[8] The ZDHS found that 30 percent of the children born to women who received no ante-natal care or assisted delivery died before the age of five years compared to 18 percent of children whose mothers received both services (table 8). It is impossible to unravel the degree to which this is due to factors related to the mothers or general living conditions, and to the effect of health services.

Table 7: Percentage of under-fives taken to a facility and treated in 10 countries of Sub-Saharan Africa and Zambia

Symptoms	Taken to a facility		Given ORS/ORT		Given drugs	
	SSA (%)	Zambia (%)	SSA (%)	Zambia (%)	SSA (%)	Zambia (%)
ARI	47	62	-	-	55	22
Diarrhoea	30	55	35	64	35	9
Fever	53	61	-	-	42	51

Note: The percentage of children in the comparison group may be an overestimation depending on whether "the pill" the children in the comparison groups received was an antibiotic. In the ZDHS 1992 study, there was no separate classification for "pill".

Source: Boerma et al 1991, Gaisie et al 1993

There was a large decline in the number of ante-natal visits between 1980 and 1989 from 149 to 107 per 1000 population. The number of assisted deliveries remained constant at 20 per 1000 population. This finding is consistent with a general decline in the provision of outreach health services.

Table 8: The relationship between maternity care and childhood mortality, 1992

Maternity care	Infant Mortality (1/1000)	Under-five mortality (1/1000)
No ANC/delivery care	188.8	299.5
Both ANC/delivery care	101.3	175.8

Source: Gaisie et al 1993

4.2.2 Inpatient case fatality rates

This section summarises the trends in case fatality rates (CFRs) for the most common fatal diseases of children in Zambia during the 1980s (table 9). The definition of a CFR is the proportion of people admitted to hospital or health centre with a specific diagnosis who die before discharge. One possible reason for a rise is that cases are more severe, due to changes in the character of the disease or in the ability of patients to recover from it. Another reason is a reduction in the effectiveness of treatment. The WHO (1996) uses CFRs as crude measures of the quality of health care.

Table 9: Case fatality rates in hospitals and health centres for children under 5 years, 1980 and 1989

Diagnosis	1980 (%)	1989 (%)
Malaria	2.1	4.3
Diarrhoea	5	10
ARI	1.8	3.0

Source: MOH Statistical Reports

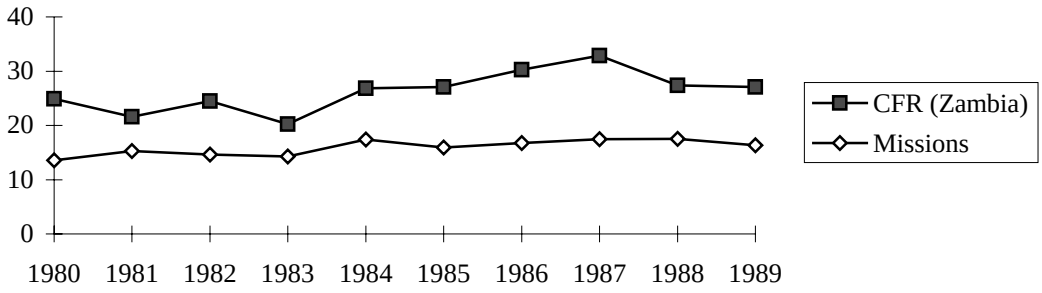
CFRs for children under five with malaria rose from 2.1 to 4.3 percent during the 1980s. It is difficult to disentangle the relative importance of periodic shortages of routine antimalarials and the increased incidence of drug resistant strains of the malaria parasite.

The CFR for children under five with diarrhoea increased from 5 to 10 percent. One reason for the rise may be that cases that came to hospital were more severe. There was very high use of oral rehydration therapy for diarrhoea by the early 1990s (Gaisie et al 1993). During the same period the total number of diarrhoea cases reported by health facilities dropped. Another reason for the rise could be a decrease in the quality of care. A recent study found poor case management of serious diarrhoea; only 3% of children with diarrhoea were treated correctly at health facilities; and 26% of children with bloody diarrhoea received antibiotics (WHO/CDD 1997).

The CFR for children under five with ARI increased from 1.8 to 3 percent. The principal means of treatment for this condition is antibiotics. The rise in mortality may reflect drug shortages and a decline in health worker performance, due to poor supervision.

The case fatality for malnutrition amongst children under five fluctuated between 20 and 30 percent (figure 5). Malnutrition accounted for over 30 percent of institutional deaths of children under 5 years, making CFRs from this condition particularly important. A recent study compared CFRs for a small sample of government and mission facilities (Hambayi et al 1996). The CFR in the government facilities rose from 22 percent in 1982 to 53 percent in 1993, and it did not rise at all in the mission hospitals. The authors conclude that this indicated that the quality of care declined in government hospitals.

Figure 5, CFRs for malnutrition for children under 5 years, 1980-1989



Source: Collected MoH/MCH data

Figure 5 compares data on average CFRs from malnutrition in all mission hospitals with the national averages. The data on mission hospitals are derived from a review of routine data from the facilities. The CFR was consistently lower in the latter facilities and it rose less during the 1980s than in government facilities.

4.3 Summary

The prolonged decline in real health expenditure had a deleterious effect on the performance of the health sector. There is evidence that a large proportion of children who visited a health worker did not receive specific treatment for their complaint. The number of ante-natal care visits fell, although the number of assisted deliveries remained more or less constant. There was a rise in case fatality rates for children in hospitals and health centres. These data suggest that there was a reduction in access to effective basic health care.

5 INTER-DISTRICT MORTALITY DIFFERENCES

The average under-five mortality rate varied considerably between districts. According to census data, the U5MR in rural districts was 157 per 1000 live births in 1990, but it was above 175 in 13 districts and below 125 in 10. This section explores whether differences in the provision of basic health services contributed to this variation.

Mission health facilities do not appear to have experienced the same deterioration of services as government ones (Ojermark 1992). The PRA study undertaken for this project reinforced this impression. It found consensus amongst members of the community that the mission hospitals coped better with severe financial constraints (Milimo 1997). A review of the annual reports of 16 mission health facilities revealed that these facilities experienced financial problems throughout the 1980s, but were usually able to obtain drugs and other supplies and benefited from the availability of expatriate doctors.

If the provision of health services is important, we would expect to find that people living in the catchment area of mission hospitals had fewer childhood deaths than the rest of the population. It is not possible to assess childhood mortality for each facility's catchment area. For the purpose of this analysis the 48 rural districts were divided into 23 mission districts, in which there was one or more mission hospital, and 25 government districts, without any mission hospitals. This does not fully differentiate between the two categories of facility because a substantial proportion of the population in many "mission" districts were served by government facilities.

The mission districts tend to be located further from the line of rail and to be poorer. The proportion of households with incomes below the poverty line and with female-headed households in 1991 was higher in mission districts (table 10). Furthermore a smaller proportion of households in these districts had at least one month's stock of food. All of these indicators suggest that the residents of mission districts experienced greater health-related stress than those living in government districts. In spite of this they had lower under five mortality rates, although the difference was not statistically significant.

Table 10: Socio-economic and mortality differences between government and mission districts

Classification of districts	Proportion of poor households (%)	Proportion of households with stocks of food for one month (%)	Proportion of female headed households (%)	Under five mortality (1/1000)
Government	65	35	14	167
Mission	72	32	15	152

Sources: CSO 1993, CSO 1995, Flamm 1995

The number of antenatal visits and assisted deliveries per capita reflects the supply of services and the public perception of their quality (the willingness of people to use the services). At the end of the 1980s mission districts provided 27 percent more antenatal visits and 75 percent more assisted deliveries per capita than government districts (table 11). The difference between government and mission districts in the rate of assisted deliveries was statistically significant.

Table 11: Provision of health services in government and mission districts, 1987-89*

Classification of districts	Number of antenatal visits per capita	Number of assisted deliveries per capita
Government	0.11	0.008
Mission	0.14	0.014

* Averages for 1987-1989

Table 12 presents the relationship between indicators of socio-economic and health service determinants of child health, and under five mortality. As expected, there is a positive relationship between both poverty and malnutrition and U5MR. However, neither relationship is statistically significant. On the other hand, there is a strong negative relationship between the rate of assisted deliveries and the U5MR. This supports the hypothesis that a lack of basic health services can lead to high childhood mortality. The number of assisted deliveries is an indirect measure of the effectiveness of appropriate health services. These findings suggest that effective health services reduced the number of childhood deaths in some districts.

Table 12: Correlation between factors believed to contribute to child health and U5MR 1990

	Poverty	Malnutrition	Assisted deliveries	U5MR
Poverty	1.000	.5753 P=.000	-.1025 P=.488	.0889 P=.548
Malnutrition	.5753 P=.000	1.000	-.0802 .588	.1768 P=.229
Assisted deliveries	-.1025 .488	-.0802 P.588	1.000	-.3445 P=.017
U5MR	.0889 P=.548	.1768 P=.229	-.3445 P=.017	1.000

The importance of access to health services is confirmed by a multiple regression between the three independent variables and U5MR. The coefficient for assisted delivery was negative and significant at the 2 percent level. None of the coefficients for the other variables in the equation were significantly different from zero.

6 DISTRICT CASE STUDIES

6.1 Introduction to the Study Districts

Case studies were carried out in Katete, Petauke and Chadiza Districts in Eastern Province and Monze District in Southern Province to explore, with health workers and community members, the reasons for the high levels of childhood mortality. All four districts are largely rural with populations between 63,000 and 250,000 (table 13). They all have low population densities. In three districts the annual rate of population growth was more than 3 percent. It was less than 1 percent in Monze, possibly due to outmigration to Lusaka. The percentage of female-headed households (FHH) was between 7 and 22 percent.

Table 13: Demographic information on the study districts, 1990

District	Population ('000)	Population density (/km^2)	Annual population growth 1980-90 (%)	Proportion of female-headed households (%)	Proportion of the population rural (%)
Chadiza	63.2	24.7	3.35	14	95
Katete	138.5	35.0	4.24	17	94
Petauke	249.5	13.4	4.90	22	96
Monze	126.0	32.4	0.97	7	90

Source: CSO 1995

Childhood mortality varied considerably between the districts (table 14). In 1990 the U5MR ranged from 127 in Monze to 221 in Chadiza. Mortality rose in all four districts during the 1980s, but it rose particularly steeply in Petauke. The following sections explore factors which may have contributed to the rise in mortality.

Table 14: Under-five mortality in the study districts, 1980-1990

District	U5MR 1980	U5MR 1990	Change in U5MR (%)
Chadiza	187	221	20
Petauke	132	190	44
Katete	140	168	20
Monze	110	127	14

Source: CSO 1995

All four districts had large numbers of people living in poverty in 1991 (Table 15). The number of core poor (without enough income to purchase a minimum diet) varied from 52 to 73 percent.[9] An additional 12 to 21 percent earned less than the poverty line. The number of non-poor ranged from 11 to 27 percent. The four districts were amongst the five hit the hardest by the drought of 1991/92 (CSO 1992). They experienced substantial increases in the number of households living below the poverty line during the 1990s.

Table 15: Proportion of poor households in the study districts, 1991

District	Core Poor (%)	Poor (%)	Non-Poor (%)
Chadiza	52	20	27
Katete	68	21	11
Petauke	70	13	17
Monze	73	12	15

Source: CSO 1993

Table 16 summarises the number and kinds of facilities in each district. Chadiza has 1.3 beds per 1000 population, 11 government rural health centres and no hospitals. Katete has 2.4 beds per 1000 population, in a 274 bed mission hospital and 14 government rural health centres. Petauke has 1.9 beds per 1000 population, in 2 mission hospitals with a total of 250 beds and the 24 government facilities. Monze has 2.7 beds per 1000 population, in a 289 bed mission hospital, 2 mission rural health centres and 13 government rural health centres.

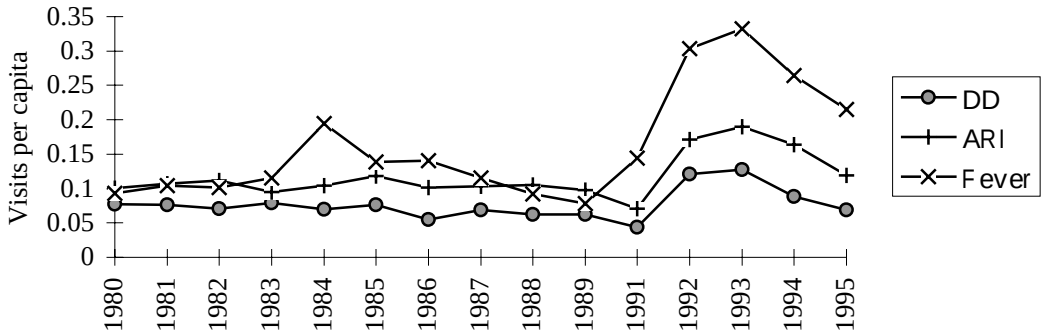
Table 16: Health facilities in the study districts

	Number of institutions	Beds	Cots	Beds per 1000 population	Proportion of beds in mission facilities (%)
Chadiza	11	83	11	1.3	0
Katete	15	332	93	2.4	82
Petauke	26	477	50	1.9	52
Monze	16	427	22	2.7	77

Source: Health Facility Inventory, MOH 1994

The data from the annual returns from health facilities in the study districts present a picture of static levels of morbidity during the 1980s, and a rapid rise during the early 1990s (figure 6). This rise was related to the drought and the subsequent rise in malnutrition and poverty. It also may reflect improved drug availability. It is difficult to judge the quality of services provided, on the basis of routine health management information.

Figure 6, Number of visits by children under five years to health facilities in the study districts relative to the district population, 1980-1995



Source: Collected MoH/MCH data

6.2 Findings of the Study by the Participatory Assessment Group

This section presents the principal findings of a special study by the Poverty Assessment Group (Milimo 1997). The team collected data from the sites listed in table 17. They asked members of the population and health workers about current problems and how they contribute to childhood deaths. They also asked whether things had improved or worsened since the 1980s.

Table 17: Study sites in the four districts

District	Facility
Katete	Katete Hospital
Katete	Katete Boma RHC
Katete	Kagoro RHC
Chadiza	Chadiza RHC
Chadiza	Miti RHC
Petauke	Petauke Hospital
Petauke	Mwanjabantu RHC
Monze	Monze Mission Hospital
Monze	Njola RHC
Monze	Luyaba RHC

6.2.1 Causes of childhood death in the study districts

The interviewees identified their major problems as inadequate food supplies and poverty. In most cases these problems had worsened since the drought of the early 1990s. One farmer in Monze described the fall in living standards since the 1980s as follows:

> If you (researchers) had come here ten years ago you should have seen a lot of people ploughing all over. Now you see just one span of oxen and maybe the neighbours (of the owner of the oxen) are just waiting to use the same oxen. Those five span of oxen you saw ploughing one field as you drove by could not have possibly belonged to one person, as would have been the case previously. Most likely it is five different households coming together and ploughing for each other.

Ranking exercises were carried out to discover peoples' views on the most serious diseases of children. Malaria came out first in all four districts, followed by diarrhoea in three of the districts. The exception was Petauke, where upper respiratory tract infections came just ahead of diarrhoea. Other health problems were eye sores, pneumonia, malnutrition, and coughs and fevers. Malaria was identified as the greatest cause of child deaths followed by diarrhoea and coughs. Malnutrition was said to be involved in most of the deaths due to these diseases. AIDS was also reported to be an important contributing factor.

Figure 7 shows what ordinary members of the Chadiza community thought were the causes of the rising numbers of deaths in childhood. One factor was drought, which was responsible for inadequate food supplies, which caused children's bodies to swell (malnutrition). Once this happened many became ill and died. They also identified diarrhoea (due to poor food preservation and bad water), HIV/AIDS (due to factors leading to parental infection), and lack of immunisation as important factors.

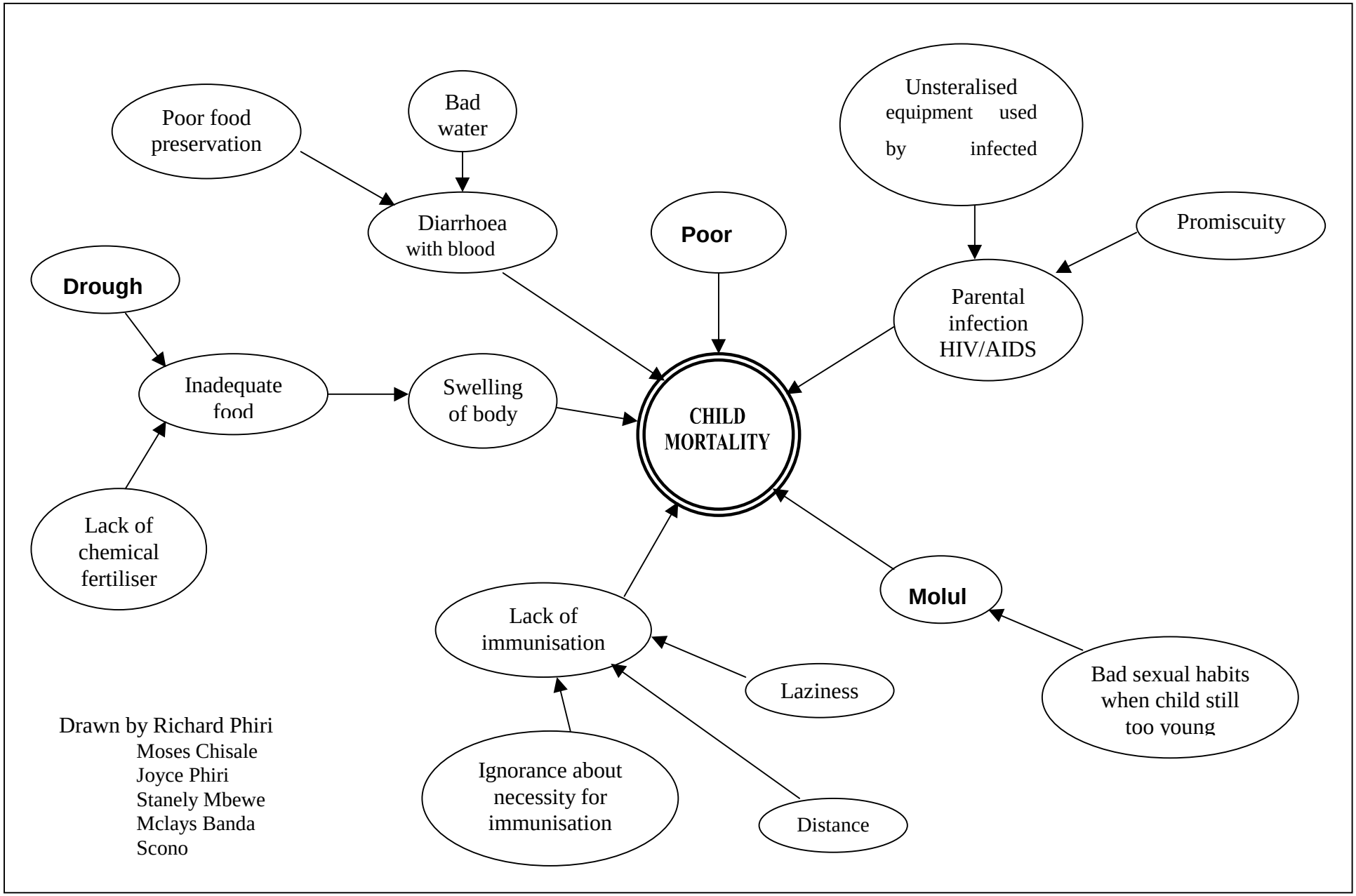
Villagers found it difficult to describe changes in the levels of childhood ill health. However, they did report that malaria had been a disease of the wet months (January-March) during the 1980s, but was now a year-round problem. AIDS has also taken on increasing importance.

6.2.2 Problems with the health services

Ordinary community members and health practitioners reported a gradual decline in the quantity and quality of health services. Members of the study communities complained that health facilities did not have adequate supplies of drugs. They gave examples of being given the same drug for different ailments and of sharing tablets between two or more patients. Senior health providers acknowledged the persistence of problems with shortages, particularly of drugs not on the essential list, in spite of the major improvements which have occurred over the recent past. Previously, there had been severe drug shortages.

The quality of health services has been adversely affected by poor remuneration of health workers coupled with other negative factors in their conditions of service, such as lack of proper accommodation. These factors, which have worsened during the past decade, have adversely affected child health care. So has access to health services which is determined, among other things, the ability to pay fees and other charges.

Figure 7: Causal Flow Diagram on Child Mortality (Drawn at Chadiza)



Source: Milimo, John., Participatory Assessment Group, "PRA Study of the Rising Childhood in Zambia". Report prepared for the IDS, Lusaka, April 1997.

Mission health facilities were found to be doing better than government ones, despite the fact that mission hospitals received only half as much from government as comparable government facilities. A protocol signed in 1996, which will raise government funding to 75 percent, had not been put into practice at the time of the study.

The team identified two reasons why the two mission facilities visited provided better health services than government facilities:

- The mission facilities went out of their way to make things happen the way they should. For example, they ensured that drugs were available, by arranging to barter drugs with other institutions, and/or making arrangements with other agencies to provide grassroots health personnel with transport. The consequence of these efforts, which were not reported in government facilities, is that all essential inputs were present (drugs, functioning equipment and transport).
- Equally important, was the availability of highly trained, motivated and dedicated staff at mission health facilities. Many of the senior doctors were expatriates working under reasonably satisfactory, donor/mission, conditions of service. They were under much less pressure than local health workers to divert energy to secondary jobs and alternative sources of income. The mission doctors were more likely to concentrate all their time and energies on helping the sick. These attitudes have been imparted to lower level health workers in mission facilities.

In short, the mission hospitals were better supplied with motivated and qualified health personnel and they managed to have access to drugs, equipment and transport. All this made them more effective in promoting better health service delivery to children and the rest of the communities.

6.2.3 Recommendations and suggestions

The interviewees made a number of suggestions for improving the health of young children and the following were endorsed by the PRA study team (Milimo 1997).

Malnutrition: Communities should be encouraged to grow their own nutritious foodstuffs and be taught how to prepare them, given the unreliable and erratic supply of supplementary foods, especially high energy proteins. The Ministries of Agriculture, Community Development and Health should adopt an integrated approach towards the provision of supplementary foods. There is also a need for intensified health-nutrition education focusing on:

- addressing the belief-system which incorrectly associates breast-feeding when the mother is pregnant with fatal illness of the suckling baby,
- the need to convince mothers to attend under-5 clinics even after the child has completed all immunisations,
- methods of preparation of nutritious food for young children, and

- training for both parents in matters of hygiene, malnutrition and family planning.

Health services: The following measures should be taken to strengthen child health services: the immunisation programme should be sustained and intensified, government budgetary allocations for drugs should be increased to ensure adequate supplies in rural facilities, and an intensive anti-AIDS campaign should be mounted, comparable in intensity and coverage to the universal child immunisation programme.

Health staff : The efforts being made through the health reforms and creation of the Central Board of Health, and District and Hospital Boards should be sustained, with a view to improving the conditions of service and raising health staff morale.

7 SUMMARY AND CONCLUSIONS

The study's aim was to review the possible explanations for the rise in childhood mortality in Zambia during the 1980s. Zambia experienced serious financial problems during that decade, however, there is no evidence of major increases in malnutrition. It is impossible to say whether or not there were increases in levels of ill health. However, the annual returns from health facilities did not report major increases in the number of consultations for childhood diseases, with the exception of malaria, which has become endemic all year-round. By the end of the 1980s HIV was beginning to have an impact. These factors do not explain the rise in childhood mortality fully.

The prolonged financial constraints on the public health sector reduced access to effective services. Mothers had reasonably good access to a health worker, when a child fell ill, but children often did not receive the appropriate treatment. Drugs were often unavailable. One sign of these problems is the rise in inpatient case fatality rates for common childhood illnesses. This may reflect a change in the case mix, but it probably also indicates serious treatment failures.

Childhood mortality varied considerably between districts. This is not explained by the proportion of households with incomes below the poverty line or the proportion of underweight children. On the other hand there is a strong negative relationship between the rate of assisted deliveries and childhood mortality. This points strongly to the importance of effective basic health services.

The districts which did better than the rest of the country tended to be served by mission health facilities, which escaped the worst negative consequences of the severe resource constraints. There are strong grounds for taking a closer look at why these districts were more successful in preventing childhood deaths. This would involve comparisons of the kinds of services provided by different districts and the factors which made services in some districts more effective than in others This could provide important lessons for other districts about strategies that work in Zambia.

Since the beginning of the 1990s, Zambian households have experienced a number of shocks: a serious drought, the lifting of government subsidies on staple foods, the rise in incidence of malaria, and the spread

of HIV. The effects of chronic resource shortages on water supplies and the disposal of human wastes is not well known.[10] All of these factors have increased the risk of children falling ill and dying.

Any strategy for slowing down, or reversing, the rise in childhood mortality will have to combine measures aimed at relieving the social and economic causes of childhood deaths, preventing exposure to specific illnesses and treating sick children. If these measures are not taken, childhood mortality could continue to rise with serious consequences for the future.

NOTES

1. This information comes from the Zambia Demographic and Health Survey (Gaisie et al 1993). The 1980 and 1990 censuses estimate lower U5MRs, although similar rates of increase. The DHS is a well-respected survey which interviews women in depth about births and deaths of children, and its mortality estimates are probably closer to reality than the census. A repeat survey found a U5MR of 203 in 1996 (MOH 1997).
2. Dzekedzeke 1994, Unicef 1994, World Bank 1994, Nsemukila 1996
3. Ojermark 1992, USAID 1995
4. UNECA 1985, UNICEF 1986, GRZ/WHO/UNICEF 1984, National Nutrition Surveillance Programme 1984, CSO 1985a
5. Hone and Femor 1987, Ng'andu and Baboo 1990, Watts et al 1990, NFNC 1994
6. Pinstrup Andersen et al 1993, Dzekedzeke 1994
7. CSO 1993 and 1995, Gaisie et al 1993; FHANIS 1995, MOH 1997
8. There are disputes about the effectiveness of ante-natal care on childhood mortality. Some argue that it can reduce perinatal and infant mortality by identifying high risk pregnancies. Others question the capacity of ante-natal care to prevent obstetrical complications and influence maternal and child mortality where health services are not effective and living conditions are harsh (Walsh et al 1993, WHO/UNICEF 1996; M. McDonagh, 1996; Pebley et al 1996, MOH 1989, MOH 1996). Several assessments of maternal health care in Zambia suggest that a large proportion of ANC visits were of limited value because of lack of drugs and supplies and poorly trained personnel (UNICEF 1986, 1996, Faber and Koster-Oyekan 1994; LeBacq and Reitsema 1995). One study found that rural health centres had the same capacity to provide MCH services as health posts and dispensaries and another found that ampicillin was available only 7% of the time.
9. The moderate poverty line ("poor") was K1,380 per male adult equivalent per month and extreme or core poverty was K961 according to PSI 1991 (CSO 1993).
10. According to recent UNICEF statistics, 43 percent of rural people disposed of human wastes in a sanitary manner and 17 percent of rural people had access to safe water (data provided over the world wide web).

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